

CNCS

Year 10 Science: Curriculum Overview

Rationale: In Year 10 students will build on prior knowledge from KS3 and develop their skills in key foundation concepts in Biology ready for sitting the external examinations in term 3.1. Students will learn how to work safely in a lab and investigate scientific questions. Students will revisit and be introduced to a range of specific subject terminology, learning how to identify and discuss this appropriately. Furthermore, students will be given opportunities to develop their own personal responses to scientific problems and consider how to apply their knowledge to them

A learner in Year 10 will know/ have studied:

Key areas in all three sciences, this will build the foundation for further study in Biology. They will have worked in a lab and know the key safety rules to follow. They will have carried out key investigations to help with their understanding of the areas taught.

A learner in Year 10 will be able to:

Work safety in lab and carry out investigations. They will be able to question and have begun to understand the world around them from the units studied. They will answer exam questions with confidence and skill.

Term	Outline	Assessment	Home Learning	Key Skills/ End Point
1	<p>B1 Cells and transport Students will</p> <ul style="list-style-type: none"> compare different types of cells and microscopes and use a light microscope to view cells (Required Practical) describe the importance of cells becoming specialised through differentiation and the how this helps their function and describe how to prepare a sterile culture of bacteria (Required Practical) (LINKS TO B3) describe the stages of mitosis and where it fits in the process of the cell cycle, sources of stem cells and their uses describe the processes of diffusion, osmosis and active transport and examples of each type of transport in animals and plants and describe the effect of concentration of solution on osmosis in plant tissues (Required Practical) <p>B2 Organisation Students will</p>	<p><u>1.1 & 1.2 Pit stops</u> Pitstop B1.1 Pitstop B1.2 Pitstop B1.3 Pitstop B2.1 Pitstop B2.2 Pitstop B3.1 Pitstop B3.2 Pitstop B4.1</p> <p><u>1.2 End of term assessment</u></p> <p>Paper 1 Biology Mock; Using the most recent secure paper. Knowledge coverage: B1 Cells and transport B2 Organisation B3 Infection and response B4 Bioenergetics</p> <p><u>Skills tested:</u></p>	Weekly content recall and application questions set on Educake	<p>Skills:</p> <ul style="list-style-type: none"> Recall of key knowledge through the use of low stakes testing. Application of knowledge to unfamiliar contexts through exam question modelling. Interpretation of diagrams used to represent key processes. Development of maths skills through converting units and calculating rate of photosynthesis. Describing and explaining of graphical data when investigating the effect of named factors on enzyme action, interpretation of data on diseases among the population and investigating the effect of named factors on rate of photosynthesis. Development of evaluative skills: use of stem cells to treat medical conditions; advantages and disadvantages of treatments for CHD

	<ul style="list-style-type: none"> describe how cells make up tissues, which make up organs, which make up organ systems, describe the structure and function of the digestive system and describe the structure and function of three digestive. use food tests to identify what molecules are found in foods (Required Practical) and investigate the effect of pH or concentration on enzyme action (Required Practical) describe the structure of the lungs, how they are adapted for gas exchange, the mechanism of breathing describe the structure of the heart and associated blood vessels, compare the of structure and function of arteries, veins and capillaries, describe the four components of blood and their functions and state the causes and treatment of diseases of the heart, including CHD and faulty valves describe how diseases interact with each other, how lifestyle can contribute to development of diseases, including diet, exercise, genetics, smoking and alcohol and state the difference between benign and malignant tumours and how cancer spreads around the body describe the structure of a leaf and the function of the tissues present and the process of transpiration by evaporation of water from the leaf <p>B3 Infection and response Students will</p>	<p>AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures.</p> <p>AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures.</p> <p>AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.</p>		<p>and advantages and disadvantages of monoclonal antibodies.</p> <ul style="list-style-type: none"> Development of practical skills during the RP activities; taking measurements, recording results, assessing risks. <p>End point:</p> <ul style="list-style-type: none"> Students are able to recall key knowledge and apply this knowledge to exam questions from different areas. Students can interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts. Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate medical treatments.
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	<ul style="list-style-type: none"> • Define what a pathogen is and give examples of each type of pathogen and how they cause disease/spread/are treated • Describe how humans defend themselves against disease; before pathogens enter the bloodstream and after and how vaccination protects against disease and prevents spread of disease • State that antibiotics can be used to treat bacterial infections but not viruses (LINKS TO B1 and B6), describe where specific drugs originated from and that many drugs we use come from plants and state the stages in drug trialling to test for toxicity, efficacy and dosage • Describe how monoclonal antibodies are produced and their uses • Causes and effects of plant disease/deficiencies and how they can be detected (LINKS to B7) • Ways in which plants defend themselves from disease and predators (LINKS to B7) <p>B4 Bioenergetics Students will</p> <ul style="list-style-type: none"> • State the word and symbol equation for photosynthesis and how plants absorb the energy needed for this process (LINKS to B2) and describe that photosynthesis is an endothermic reaction and state that plants produce glucose during photosynthesis and the 5 ways plants use this glucose • State the limiting factors of photosynthesis and how and why they 			
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	<p>affect rate of photosynthesis (Required Practical)</p> <ul style="list-style-type: none"> State the word and symbol equation for aerobic respiration and the word equation for anaerobic respiration in animals and in plants/yeast State that respiration is an exothermic reaction and the uses of energy released from respiration Describe the effects on the body of anaerobic respiration and the uses of products from anaerobic respiration in industry Describe the effect of exercise on heart rate and breathing rate Define metabolism, give examples of metabolic reactions and factors affecting a person's metabolic rate 			
2	<p>B5 Homeostasis and response Students will</p> <ul style="list-style-type: none"> Describe homeostasis is the maintenance of internal conditions of the body, the sequence of a reflex arc and the function of reflex actions the structure of the CNS and describe how to investigate the effect of a named factor on reaction time (Required Practical) Describe the structure of the brain and explain why treating brain injury is difficult and how the brain can be studied Describe the structures and functions of the eye, explain how the pupil is involved in adapting to changing light levels, how the lens is involved in accommodation to focus on objects of different distances 	<p><u>2.1 & 2.2 Pit stops</u></p> <p>Pitstop B5.1 Pitstop B5.2 Pitstop B6.1 Pitstop B6.2 Pitstop B6.3 Pitstop B7.1 Pitstop B7.2 Pitstop B7.3</p> <p><u>2.2 End of term assessment</u></p> <p>Paper 2 Biology Mock; Using the most recent secure paper. Knowledge coverage: B5 Homeostasis & Response</p>	Weekly content recall and application questions set on Educake	<p>Skills:</p> <ul style="list-style-type: none"> Recall of key knowledge through the use of low stakes testing. Application of knowledge to unfamiliar contexts through exam question modelling. Interpretation of diagrams used to represent the reflex arc. Development of maths skills through converting units and calculating mean reaction times and calculating rate of decay, energy transfers between organisms and coverage of organisms in a certain habitat. Describing and explaining of graphical data when investigating hormone levels/levels of substances in

	<p>and how eye defects can be corrected using lenses</p> <ul style="list-style-type: none"> • Describe the ways our body responds to high or low temperatures in terms of: hairs on skin, blood vessels, sweat production, shivering • Describe the location of the following organs in the endocrine system and their functions: pituitary gland, adrenal glands, ovaries, testes, thyroid gland, pancreas • Describe the role of hormones • Describe the impact of insulin and glucagon on blood glucose levels and the causes of Type 1 and 2 diabetes • Describe the role of the kidney and ADH in producing water and maintaining water levels • Describe the role of hormones involved in the menstrual cycle and their specific functions as well as how they interact with each other • Describe methods of contraception, including role of hormones in oral contraceptives and how hormones can be used to treat infertility and the stages of IVF • Describe the roles of thyroxine and adrenaline • State examples of tropism in plants and how auxin is involved in phototropism and geotropism and the role of ethane and gibberellin • Investigate how light/gravity affects the growth of seedlings (Required Practical) <p>B6 Inheritance, variation and evolution</p>	<p>B6 inheritance, variation & evolution B7 Ecology</p> <p>Skills tested:</p> <p>AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.</p>		<p>blood/urine. Interpretation of charts/diagrams to understand links between organisms and investigating factors affecting communities, predator-prey cycles, processes in the carbon cycle and statistics involving food security.</p> <ul style="list-style-type: none"> • Development of evaluative skills: advantages and disadvantages of mechanical devices/transplants to treat organ failure; evaluating the risks associated with IVF; benefits and concerns of GM crops; evaluating theories and understanding why they develop over time and the use of peat bogs to produce compost, implications of deforestation, farming and waste management, ethical implications of intensive farming. • Development of practical skills during the RP activities; taking measurements, recording results, assessing risks. <p>End point:</p> <ul style="list-style-type: none"> • Students are able to recall key knowledge and apply this knowledge to exam questions from different areas. • Students can interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts.
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	<p>Students will</p> <ul style="list-style-type: none"> • Describe the differences between sexual and asexual reproduction and the advantages and disadvantages of sexual and asexual reproduction • Describe the stages of the cell cycle and the specific stages of meiosis • Describe the structure of DNA • Describe the structure of a protein and the possible effects of a mutation • State the definitions of key terminology: gamete, chromosome, gene, allele, dominant, recessive, homozygous, heterozygous, genotype, phenotype • Complete a punnet square diagram to predict characteristics of offspring and describe the inheritance of cystic fibrosis, polydactyly and gender • Describe the causes of Variation and the processes of natural selection, selective breeding and genetic engineering (LINKS TO B7) • Describe methods of cloning in plants and animals; adult cell cloning steps • Compare Darwin and Lamarck's theories • Describe the process of speciation • Describe Mendel's role in our understanding of genetics • Describe how fossils are evidence of evolution and how they are fossils may be formed • Describe the factors leading to extinction • Describe how antibiotic resistant bacteria develop (LINKS TO B3) and the advice Doctors should give to reduce rate of development of antibiotic resistance 			<ul style="list-style-type: none"> • Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate various theories/treatments/processes.
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- Describe the three-domain system and the hierarchy of the classification system

B7 Ecology

Students will

- Describe the resources animals and plants compete for, the factors affect communities, the levels of organisation in an ecosystem: organism, population, community, ecosystem, and the difference between biotic and abiotic factors and examples of each
- Describe the adaptations of organisms to allow them to survive in a particular environment e.g. cold, hot and that extremophiles are organisms that live in extreme conditions
- Describe how the abundance of organisms can be estimated/investigated using quadrats (Required Practical)
- Describe the processes that occur in the carbon cycle, including: photosynthesis, respiration, decay and combustion, the processes in the water cycle, including evaporation and precipitation and the conditions required for decomposition
- Investigate how the rate of decay of milk can be investigated (Required Practical)
- Describe the use of biogas generators in producing fuels
- How changes to temperature, levels of atmospheric gases and water availability affect distribution of organisms, that biodiversity is the variety of all different species in an ecosystem and why it is important, the role of waste

	<p>management, land use, deforestation and global warming in affecting biodiversity and the ways that we can help to maintain biodiversity</p> <ul style="list-style-type: none"> • How to use trophic levels to draw pyramids of biomass, how biomass/energy is lost as you move along the food chain, what food security is and how we are threatening it globally, how farmers can increase the efficiency of food production by controlling temperature and amount of movement, how fishing can be made sustainable, how fungi are used to produce mycoprotein and how bacteria can be used to mass produce hormones like insulin (LINKS TO B6) 			
3	<p>Students will follow a bespoke revision programme until the end of the external assessments in June</p> <p>Students will then follow a re-cap and review programme of year nine content for the last three weeks of year 10. This will allow for a rapid start in year 11 as pupils prepare for their GCSE's in Chemistry and Physics.</p>	<p>3.1 & 3.2 Pit stops These will reflect the needs of pupils based on gap analysis of mocks and the revision programme in place</p> <p>3.2 End of term assessment Pupils will sit external examinations in Biology</p> <p>Skills tested: AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgements</p>	Exam practice booklets and content recall questions	<p>Students are able to recall key knowledge and apply this knowledge to exam questions from different areas.</p> <p>Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts.</p> <p>Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided</p>

		and draw conclusions; develop and improve experimental procedures.		
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